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Cardiff Road
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1. Your reference — 11416P1 GB/ED

2. Patent application number *(The Patent Office will fill this part in)* — 0406720.3 — 25 MAR 2004

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

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Patents ADP number *(if you know it)* 07972136002

If the applicant is a corporate body, give the country/state of its incorporation — England

4. Title of the invention

Chemical Composition And Uses

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

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Patents ADP number *(if you know it)* 07517675002

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Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

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Yes

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Patents Form 1/77

9. Accompanying documents: A patent application must include a description of the invention. Not counting duplicates, please enter the number of pages of each item accompanying this form:

Continuation sheets of this form	
Description	42
Claim(s)	6 DC
Abstract	1
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10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent (Patents Form 7/77)	
Request for a preliminary examination and search (Patents Form 9/77)	One
Request for a substantive examination (Patents Form 10/77)	One
Any other documents (please specify)	FS1A

11. I/We request the grant of a patent on the basis of this application.

Signature(s) Elizabeth Anne Dickson Date 25 March 2004

12. Name, daytime telephone number and e-mail address, if any, of person to contact in the United Kingdom

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CHEMICAL COMPOSITION AND USES

This invention relates to chemical products and compositions; in particular, but not exclusively, to cleaning products and their uses in methods of cleaning.

It is known that over a wide array of cleaning operations, improved results are obtained when the operation is carried out at elevated temperatures. Hence, warm water rather than cold water, is often used. Aside from such cleaning benefits, the feeling of warmth gives the user of the cleaning product reassurance that effective cleaning is taking place. It also makes the cleaning operation more pleasant to carry out. Nevertheless, it is not always possible to have ready access to a convenient source of warm water when cleaning.

It would therefore be of benefit to provide a cleaning product comprising a composition comprising a plurality of components, initially kept separate from each other, which when mixed together react and give out heat, such that the composition thus formed is at an elevated temperature compared to the temperature of the individual components of the composition. As a consequence, the environment of any surface to which the composition, or the components of the composition, is/are applied will have its temperature increased by such application. It is therefore an object of the present invention to provide such compositions.

It would also be advantageous to provide a composition at an elevated temperature which can be applied directly onto the surface to be treated or cleaned without the need for a substrate, or the like. The use of such substrates,

such as cleaning substrates e.g. fibrous materials, and the like, can exhibit disadvantages because there is the risk of spillage when applying the composition to the substrate, or overloading the substrate. Moreover, there is the risk that the user's hands may become coated with the composition during application of the composition to the substrate. It is therefore a further object of the present invention to provide compositions which can be applied directly to the surface to be treated, thus providing an elevated temperature directly onto the surface itself, rather than via a substrate. A further advantage is that any temperature rise when forming the composition will be more directly effective on the surface to be treated, rather than being effective on the substrate which is then applied to the surface. In other words, application of the composition, or the components of the composition, directly to the surface to be treated will avoid the need to heat the cleaning substrate by, for example, immersing it in warm water before using the substrate.

It would also be advantageous to provide a composition comprising a plurality of components, initially kept separate from each other, which when mixed together, react and give out heat, and form a composition which exhibits a final pH value enabling said composition to be safely handled by the user and enabling said composition to be effective in cleaning operations. It is therefore a yet further object of the present invention to provide compositions.

Therefore, there remains the need to provide compositions, particularly cleaning compositions formed via cleaning

products, that comprise initially separated components, which, when these components are mixed or come together, i.e. combine, form a composition at an elevated temperature compared to the components themselves, and with a pH value in a range suitable to be handled directly by the user, which do not require the presence of a separate cleaning substrate such as a fibrous material, and wherein each separate component is in a ready-to-use form, i.e. is already diluted or dispersed to the required concentration in the component itself such that no further dispersion, dilution or dissolution is required. In other words, the actual mixing or combination of the initially-separated components of the composition provides a composition exhibiting the above properties.

According to the present invention there is provided a product, a method of manufacturing a cleaning product, a method of providing a cleaning composition, a method for the treatment of a surface, and the use of a composition, as set forth in the appended claims. Moreover, there is provided a kit, and an applicator means as described and defined herein.

Thus, according to a first aspect of the invention there is provided a product comprising separate first and second compartments, the first compartment containing a first component of a composition in a stable environment, the second compartment containing a second component of the composition in a stable environment, wherein, in use, the said two components are combined together to form said composition, and wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination.

Preferably, the product is a cleaning product and in this embodiment, the first and second components are components of a cleaning composition, such that in use, a cleaning composition is formed wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination.

By "stable environment" we preferably mean that each component within each compartment of the product does not degrade or otherwise deteriorate to an appreciable extent or become unviable over a time period representing a reasonable shelf-life for cleaning products and the like, e.g. 0.5-2 years or so, at ambient conditions.

Suitably, the temperature of the composition is elevated when compared to the temperature of the components prior to said combination, preferably said temperature is elevated by at least 5°C, more preferably at least 10°C, yet more preferably at least 20°C, even more preferably at least 25°C, more preferably at least 30°C, most preferably at least 40°C. Preferably, these elevated temperatures are still exhibited at least 30 secs after the components are mixed, more preferably at least 60 secs, even more preferably at least 120 secs, yet even more preferably at least 180 secs, most preferably at least 240 secs after the components are mixed. Preferably, these elevated temperatures are first exhibited within 120 secs of mixing said components, more preferably within 60 secs of mixing, yet more preferably within 30 secs of mixing, yet more preferably within 15 secs of mixing, most preferably immediately the components are mixed, or shortly thereafter, i.e. within about 10 secs of mixing.

Preferably, the temperature of the composition is elevated by at most 60°C, more preferably at most 55°C, most preferably at most 50°C. Suitably, the temperature is elevated to a temperature which allows the user to touch the composition without scalding.

Suitably, the first and second components of the product of this aspect of the present invention are mixed simply by adding the two components together. This mixing or combining can be performed either directly on the surface to be treated, or alternatively, the two components can be mixed or combined before the product is required for use and then added pre-mixed to the surface or mixed/combined during application itself, e.g. within an applicator nozzle, or the like. In the latter case, the mixed components should be added to the surface whilst the beneficial elevated temperature properties of the product are still evident. However the former case of mixing/combining directly on the surface is preferred.

It has surprisingly been found that products as defined above exhibit improved properties, for example improved cleaning properties, compared to conventional products wherein the two components are not mixed directly on the surface or are not mixed just before adding the product to the surface and where there is no or only minimal temperature elevation.

Suitably, the components of the product are such that when the components mix, the temperature of the product thus formed is elevated compared to the temperature of the components. As noted above, this increase in temperature

provides beneficial effects to the user of the product, both in improved performance of the product, particularly improved cleaning performance, and improved conditions for the user, in that the cleaning operation becomes more pleasant to carry out.

One further advantage of the products of the present invention is that no separate cleaning substrate is required, upon which the components of the product are mixed and which then carries the composition thus formed. As such, the product of the present invention can advantageously be added directly to the surface to be treated, at which point a substrate can be used, if desired. Moreover, there is no need to heat the substrate or add hot or warm water to the substrate to provide a heating effect. On the contrary, the elevated temperature is provided by the mixing of the components of the composition themselves.

Thus, preferably, the product does not contain a cleaning substrate, such as a pad, wipe, mat or sponge.

A yet further advantage of the present invention is that both components can be pre-formulated, i.e. made up in a ready-to-use form. As such, the user need simply cause the two components of the composition to mix to provide the composition with the beneficial properties described herein. Specifically, there is no requirement for the components to be dispersed and/or diluted in a carrier medium, e.g. water, mains water.

The term "cleaning" as used herein may include the following: removal of soil deposits; removal of greasy

deposits or stains; de-scaling; bleaching; and the combating of microbes (including mould) or allergens, including by one or more of antiseptic, disinfectant and bactericidal action.

Thus, cleaning may be by one or more of antiseptic, disinfectant, and biocidal action, as well as what may be termed "regular" cleaning, for example of common household surfaces such as kitchen worktops, sanitaryware surfaces, hard floors and textile surfaces.

Indeed, by "surface" we mean and include, preferably, inanimate surfaces, including non-dermal surfaces. We include both hard and soft surfaces.

By "hard surface", we include ceramics, glass, stone, plastics, marble, metal and/or wood surfaces, such as, in the household environment for example, bathroom and kitchen hard surfaces such as sinks, bowls, toilets, drains, panels, tiles, worktops, dishes, floors, and the like. Preferably, the product of the invention is a hard surface cleaner, the composition a hard surface cleaning composition.

By "soft surface", we include fabrics, textiles, clothing, carpets, curtains, upholstery, textile and fabric covered articles, and the like.

The first component may be a gel or liquid. The second component may be a gel or liquid. Preferably, however, at least one component is a liquid. More preferably, both the first and second components are liquid.

When the first and/or second component is a liquid it may be a thin (non-viscous) or watery liquid, or may be a viscous liquid, including a cream or paste. The liquid could comprise solids suspended or dissolved therein.

Suitably, as noted hereinbefore, the first and second components are such that when they mix, i.e. are combined, the temperature of the resultant composition is elevated compared to the temperature of the components immediately prior to mixing.

Suitably, in use, appropriate relative amounts of the components are mixed such that the ingredients of said components mix in the amounts required to provide the desired temperature rise and, optionally, any other desired properties. In preferred embodiments, the components are preferably mixed in a ratio between 10:1 and 1:10 by weight, more preferably between 5:1 and 1:5 by weight, most preferably between 2:1 and 1:2 by weight, for example, approximately equal amounts.

In a specific and preferred embodiment of the invention, one component comprises an oxidising agent (oxidant), whilst a second component comprises a reducing agent (reductant). In this embodiment, mixing of the first component and the second component will result in the initiation of a redox reaction, with consequent heat generation. As noted previously, the production of heat in this manner is particularly advantageous in cleaning products or compositions as heat will generally tend to speed up the cleaning process, thus providing a faster acting, easier to use, and more useful cleaning product than those without the redox technology described herein.

Moreover, the environment of the cleaning composition will be improved for the user.

In a further advantage, cleaning products as defined herein comprising one component comprising an oxidising agent, and a second component comprising a reducing agent, form when combined, a cleaning composition which is found to self-emulsify, at least to some extent, common staining elements, for example grease/fatty stains, and the like. As such, the cleaning products are "self-cleaning", i.e. no user input is required above the mixing/combining of the components to form the cleaning composition on the surface, to at least begin the cleaning process.

Generally, the more heat produced by the redox reaction, the greater the increase in temperature of the cleaning composition system when the components are mixed, and hence the greater the potential increase in the speed and efficiency of the cleaning process using the system, particularly when combined with the self-emulsification of grease effect noted hereinbefore. Nevertheless, whilst the generation of heat *in situ* is a very attractive proposition for cleaning products for use on both hard and on fabric surfaces, and in products such as depilatories, there is clearly an upper temperature limit, above which the user of the system would be placed at an unacceptable risk of injury/burns. Therefore, and preferably, the temperature of the cleaning compositions of this embodiment in use will be above ambient temperature, i.e. above the temperature of the two components before direct mixing, but below a temperature likely to cause injury/burns to the user of the composition, preferably at a temperature above ambient temperature, preferably in the

range 25°C to 75°C, more preferably 30°C to 65°C, more preferably in the range 35°C to 60°C, most preferably in the range 40°C to 55°C, for example at about 45°C, or about 55°C. However, the cleaning compositions may attain higher temperatures than those set out above for a time before the user comes into direct contact with the composition, i.e. whilst self-emulsification of the grease or other stain may be occurring.

Suitable oxidising agents include both peroxygen-based oxidising agents and hypohalite-based oxidising agents. Examples include hydrogen peroxide, hypochlorous acid, hypochlorites, hypocodites, and percarbonates. Also included are alkali metal chlorites, hypochlorites and perborates, for example sodium chlorite, sodium hypochlorite and sodium perborate. However, particularly preferred as the oxidising agent are peroxides, most particularly hydrogen peroxide. Thus, in a particularly preferred embodiment of the invention, either the first or the second component comprises hydrogen peroxide.

Preferably, the oxidising agent may also be an active oxygen generator, and this constitutes a yet still further advantage of the present invention, wherein the presence of active oxygen precursors or active oxygen producers/releasers is an advantage, e.g. in bleaching situations, particularly on fabrics.

Hydrogen peroxide is a chemical that has particular user compliance considerations. It is a relatively strong oxidising agent and as such, concentrated hydrogen peroxide solutions should not be in direct contact with the user. Although in the present invention, the

oxidising agent combines with the reducing agent to form the cleaning composition, the presence of relatively high concentration oxidising agents even as part of one of the components could prove dangerous. For instance, if the oxidising and reducing agents are not completely mixed or combined, there exists the possibility of non-reduced oxidising agent being touched by the user. Moreover, should the mixing or combining mechanism of the two components malfunction in any way, it is again possible for non-reduced oxidising agent to be present. Hence, it is preferable for the concentration of oxidising agent to be as low as possible, whilst still retaining the ability to react with the reducing agent and thus provide a heated composition.

Preferably, therefore, the oxidising agent is present in the component comprising the oxidising agent at a concentration of less than 20 wt% (where weight percent of oxidising agent is the concentration of oxidising agent in its solution in the component, i.e. the weight percent of the oxidising agent in the component comprising the oxidising agent), more preferably at a concentration of less than 10 wt%, yet more preferably in the range of 2 to 9 wt%, still yet more preferably in the range of 3 to 8 wt%, most preferably in the range of 4 to 7 wt%, for example at about 6 wt%.

It is found that if there is too much oxidising agent present, then too much heat is produced, leading to safety issues/concerns, and/or the risk posed by the presence of non-reduced oxidising agent (for example, in the case of malfunction) is too high. Moreover, the lower limit is set by the need to produce an appreciable temperature

rise, and preferably, to have a slight excess of oxidising agent to provide some active oxygen, particularly for use on fabric surfaces.

Suitable reducing agents include sulfides, sulfites, sulfates, oxazolidines, ascorbic acid, oxalic acid, iodides, ferrous ammonium sulphate, and thiosulfates, preferably alkali metal thiosulfates. Examples include sodium thiosulfate, sodium sulfite, potassium iodide. More preferred are thiosulfates, and most preferred is sodium thiosulfate. The reducing agent should be chosen to ensure that the oxidising agent behaves thus.

The preferred amount of reducing agent in the component comprising the reducing agent is preferably such that there is sufficient reducing agent present to reduce all, substantially all, or at least most, of the oxidising agent present in the other component, whilst providing a suitable temperature rise, as discussed hereinbefore. More preferably, the concentration of reducing agent is the same, or substantially the same, as the amount of oxidising agent present in the other component. Even more preferably, the reducing agent is present in the component comprising the reducing agent at a concentration of less than 20 wt% (where weight percent of reducing agent is the concentration of reducing agent in its solution in the component , i.e. the weight percent of the reducing agent in the component comprising the reducing agent), yet more preferably at a concentration of less than 10 wt%, more preferably in the range of 2 to 9 wt%, even more preferably in the range of 3 to 9 wt%, yet even more preferably in the range of 3 to 8 wt%, most preferably in

the range of 4 to 7 wt%, for example in the range 5 to 7 wt%, e.g. about 6 wt%.

It is found that if there is too much reducing agent present, then too much heat is produced, leading to safety issues/concerns. Moreover, at too elevated levels of reducing agent there may be issues of the amount of residue left on the surface. Moreover, if there is too little reducing agent present, not enough heat will be generated in the composition, and some oxidising agent may be left unreacted, leading potentially to problems concerning safety, as noted hereinbefore, and in addition excess oxidising agent, for example hydrogen peroxide, can lead to the formation of a yellow discolouration (if any base is present) and a disagreeable odour.

Thus, in a preferred embodiment of the present aspect of the invention there is provided a cleaning product comprising separate first and second compartments, the first compartment containing a first component comprising an oxidising agent in a stable environment, the second compartment containing a second component comprising a reducing agent in a stable environment, wherein, in use, the said two agents are combined together to form a composition, preferably a cleaning composition, and wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination. Alternatively, the first component may contain a first component comprising a reducing agent in a stable environment, the second compartment containing a second component comprising an oxidising agent in a stable environment.

In a particularly preferred embodiment, the component comprising a reducing agent further comprises a catalyst capable of catalysing the redox reaction between the said reducing agent and the oxidising agent in the other compartment of the product. The presence of the catalyst generally has the effect of speeding-up the redox reaction between the oxidising agent and reducing agent, thus ensuring the elevated temperature of the composition is reached earlier than in cases where no such catalyst is present.

Thus, preferably, the component comprising the reducing agent further comprises a catalyst that increases the rate of the redox reaction between the particular oxidising and reducing agents. Preferably, the catalyst comprises a metal-containing ion, more preferably a transition metal-containing ion, for example containing an ion of manganese, copper, molybdenum, or tungsten, together with an alkali or alkaline earth metal, such as sodium. More preferably, the catalyst is a tungstate compound, although other ions comprising a transition metal ion and oxygen, e.g. manganese, copper, or molybdenum with oxygen, can be used. Yet more preferably, the catalyst is an alkali metal tungstate (e.g. contains the WO_4^{2-} ion), most preferably sodium tungstate (e.g. Na_2WO_4), suitably in the form sodium tungstate dihydrate (e.g. $Na_2WO_4.2H_2O$).

Preferably, the catalyst is present in an amount sufficient to catalyse the reaction between the particular oxidising and reducing agents chosen. More preferably, the catalyst is present to a maximum of 2 wt% of the weight of the component comprising the reducing agent, even more preferably to a maximum of 1 wt%, yet more

preferably in the range 0.01 to 0.5 wt%, even more preferably in the range 0.02 to 0.05 wt%, for example at about 0.02 wt% or at about 0.05 wt%.

It is found that if there is too little catalyst present, the redox reaction will proceed in a similar manner to if no catalyst was present (i.e. there is essentially a "critical" weight of catalyst that must be present for catalysis of the redox reaction to take place).

Preferably, still further ingredients can be present in either or both of the components which form the composition, as detailed in this aspect of the present invention. In view of the fact that the components are kept in separate compartments as and until the cleaning product is used, the present invention further provides a way in which mutually incompatible or antagonistic ingredients can be kept separate throughout the shelf-life of the product, as and until the product is used. This forms a still yet further advantage of the present invention.

Conventionally, cleaning compositions are generally ready-made compositions which include all of the cleaning ingredients, and which are then stored in a convenient container until needed. Thus, ingredients which are antagonistic towards each other or are mutually incompatible are generally avoided, thus placing restraints on the ingredients that can be used in the compositions.

Examples of antagonistic ingredients include ingredients which would react with each other, or ingredients which

would inhibit another ingredient's activity, when in the same composition. Where ingredients are mildly antagonistic they may be tolerated together in some compositions but with the shelf-life of such compositions being compromised.

As noted above, cleaning compositions are generally formulated so as to avoid antagonistic ingredients, even if only mildly antagonistic. This puts constraints on the design of such pre-formulated compositions. There is a trade-off between stability and cleaning efficacy and/or cleaning spectrum (by which we mean the range of cleaning tasks which can be tackled). Stability is paramount in product design since consumers will not generally accept a product with short shelf-life. Consequently, cleaning efficacy may be modest and/or the cleaning spectrum narrow.

The present invention thus provides the further advantage that mutually incompatible or antagonistic ingredients, even mildly antagonistic ingredients, can be found in the same cleaning product, without their presence having any negative effect on the shelf-life of the product. In essence, the mutually incompatible or antagonistic ingredients will be placed in separate compartments in the product, for example, in the first and second components respectively.

Preferably, the product of the invention further comprises at least one surfactant and/or emulsification aid.

Suitable surfactants and/or emulsification aids include anionic, cationic, non-ionic and amphoteric surfactants.

One class of nonionic surfactants which may be used in the present invention are alkoxylated alcohols, particularly alkoxylated fatty alcohols. These include ethoxylated and propoxylated fatty alcohols, as well as ethoxylated and propoxylated alkyl phenols, both having alkyl groups of from 7 to 16, more preferably 8 to 13 carbon chains in length.

Examples of alkoxylated alcohols include certain ethoxylated alcohol compositions presently commercially available from the Shell Oil Company (Houston, TX) under the general trade name NEODOL (trade mark), which are described to be linear alcohol ethoxylates and certain compositions presently commercially available from the Union Carbide Company, (Danbury, CT) under the general trade name TERGITOL (trade mark) which are described to be secondary alcohol ethoxylates.

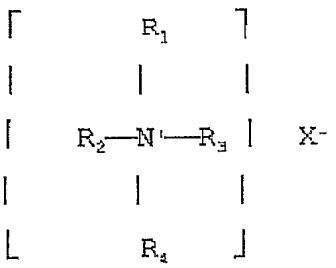
Examples of alkoxylated alkyl phenols include certain compositions presently commercially available from the Rhône-Poulenc Company (Cranbury, NJ) under the general trade name IGEPAL (trade mark), which are described as octyl and nonyl phenols.

Examples of anionic surface active agents which may be used in the present invention include but are not limited to: alkali metal salts, ammonium salts, amine salts, aminoalcohol salts or the magnesium salts of one or more of the following compounds: alkyl sulphates, alkyl ether sulphates, alkylamidoether sulphates, alkylaryl polyether sulphates, monoglyceride sulphates, alkylsulphonates, alkylamide sulphonates, alkylarylsulphonates,

olefinsulphonates, paraffin sulphonates, alkyl sulfosuccinates, alkyl ether sulfosuccinates, alkylamide sulfosuccinates, alkyl sulfosuccinamate, alkyl sulfoacetates, alkyl phosphates, alkyl ether phosphates, acyl saronsinates, acyl isothionates and N-acyl taurates. Generally, the alkyl or acyl group in these various compounds comprises a carbon chain containing 12 to 20 carbon atoms.

Other anionic surface active agents which may be used include fatty acid salts, including salts of oleic, ricinoleic, palmitic and stearic acids; copra oils or hydrogenated copra oil acid, and acyl lactylates whose acyl group contains 8 to 20 carbon atoms.

Examples of cationic surfactants which may be used in the present invention include quaternary ammonium compounds and salts thereof, including quaternary ammonium compounds which also have germicidal activity and which may be characterized by the general structural formula:



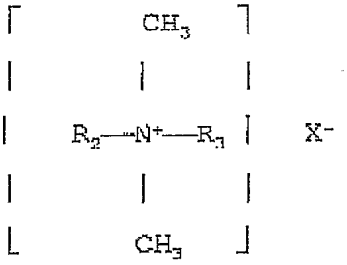
when at least one of R_1, R_2, R_3 and R_4 is a hydrophobic, aliphatic, aryl aliphatic or aliphatic aryl group containing from 6 to 26 carbon atoms, and the entire cationic portion of the molecule has a molecular weight of at least 165. The hydrophobic groups may be long-chain

alkyl, long-chain alkoxy aryl, long-chain alkyl aryl, halogen-substituted long-chain alkyl aryl, long-chain alkyl phenoxy alkyl or aryl alkyl. The remaining groups on the nitrogen atoms, other than the hydrophobic radicals, are generally hydrocarbon groups usually containing a total of no more than 12 carbon atoms. R_1, R_2, R_3 and R_4 may be straight chain or may be branched, but are preferably straight chain, and may include one or more amide or ester linkages. X may be any salt-forming anionic moiety.

Examples of quaternary ammonium salts within the above description include the alkyl ammonium halides such as cetyl trimethyl ammonium bromide, alkyl aryl ammonium halides such as octadecyl dimethyl benzyl ammonium bromide, and N-alkyl pyridinium halides such as N-cetyl pyridinium bromide. Other suitable types of quaternary ammonium salts include those in which the molecule contains either amide or ester linkages, such as octyl phenoxy ethoxy ethyl dimethyl benzyl ammonium chloride and N-(laurylcocoaminoformylmethyl)-pyridinium chloride. Other effective types of quaternary ammonium compounds which are useful as germicides includes those in which the hydrophobic moiety is characterized by a substituted aromatic nucleus as in the case of lauryloxyphenyltrimethyl ammonium chloride, cetylaminophenyltrimethyl ammonium methosulphate, dodecylphenyltrimethyl ammonium methosulphate, dodecylphenyltrimethyl ammonium chloride and chlorinated dodecylphenyltrimethyl ammonium chloride.

Preferred quaternary ammonium compounds which act as germicides and which are useful in the present invention

include those which have the structural formula:



wherein R_2 and R_3 are the same or different C_8-C_{12}alkyl, or R_2 is C_{12}-C_{16}alkyl, C_8-C_{18}alkylethoxy, C_8-C_{18}alkyl-phenolethoxy and R_3 is benzyl, and X is a halide, for example chloride, bromide or iodide, or methosulphate. Alkyl groups R_2 and R_3 may be straight chain or branched, but are preferably substantially linear.

A mixture of two or more surface active agents may also be used. Other known surface active agents not particularly described above may also be used. Such surface active agents are described in McCutcheon's Detergents and Emulsifiers, North American Edition, 1982; Kirk-Othmer, Encyclopaedia of Chemical Technology, 3rd Ed., Vol. 22, pp 346-387.

More preferably, the at least one surfactant and/or emulsification aid is present in the component comprising a reducing agent, preferably a reducing agent and a catalyst, even more preferably at a level of at least 0.5 wt% of the component, more preferably at least 0.6 wt% of the component, yet more preferably from 0.5 to 2.5 wt%, even more preferably from 0.6 to 2.1 wt%, more preferably at least 0.75 wt%, for example 0.9 to 1.2 wt%. Should the surfactant actually be added to the component as a pre-

formulated surfactant/water mix, the ranges noted above would be adjusted accordingly. For example, for a surfactant solution supplied as a 30% by weight surfactant in water solution, the amount of surfactant solution present should preferably be present at a level of at least 2 wt% of the component, yet more preferably from 2 to 7 wt%, more preferably at least 2.5 wt%, for example 3 to 4 wt%.

A yet further ingredient preferably in the component comprising a reducing agent, preferably a reducing agent and a catalyst, is a base. The presence of the base will assist in maintaining the desired alkaline pH levels of the compositions of the invention and thus avoid the unpleasant odours associated with the compositions if the pH falls below neutral, i.e. below pH=7. Although most bases are suitable, particularly preferred examples include amino-alcohol compounds, such as 2-aminoethanol, especially for hard surface cleaners, and carbonates, such as sodium carbonate, especially for fabric or soft surface cleaners.

Preferably, when present, the basic compound represents 3 to 10 wt% of the component comprising a reducing agent, preferably a reducing agent and a catalyst, more preferably 4.5 to 9 wt%, yet more preferably 5 to 7 wt%. Most preferably, when the base is a carbonate, the base represents 6 to 9 wt% of the component comprising a reducing agent, for example about 7 wt%. Furthermore, when the base is an amino-alcohol compound, the base represents 4.5 to 5.5 wt% of the component comprising a reducing agent, for example about 5 wt%. In essence, the level of base required is governed by the desire for an

excess of base in order to maintain an alkaline pH with the particular reducing agent.

It is found that if the level of base is too low, an unacceptably high excess of hydrogen peroxide may be present when the cleaning product is used, potentially leading to problems as hereinbefore described. However, if the level of base is too high, the composition formed can be an irritant and/or have a corrosive nature, and furthermore there may be negative odour and discolouration effects, and/or residues left on the surface.

Yet still further ingredients that can be present in at least one component of the product of the invention include bleaching agents, fragrances, malodour reducers or neutralisers, biocides, enzymes, insecticides, anti-static agents, antimicrobial agents, allergen neutralisers, anti-fungal agents, sequestrants. Other further ingredients could be envisaged and appreciated by those skilled in the art. Nevertheless, in the preferred embodiment of cleaning products, preferably at least one of a surfactant, bleaching agent, or enzyme is present in at least one of the components, preferably in the component comprising a reducing agent, preferably comprising a reducing agent and a catalyst. Together with the temperature rise and the ingredients of the components described hereinbefore, the at least one of a surfactant, bleaching agent, or enzyme will further improve the cleaning properties of the product of this aspect of the present invention.

Bleaching Agents

Peroxygen bleaching agents are preferred. Suitable peroxygen bleaching compounds include sodium carbonate peroxyhydrate and equivalent "percarbonate" bleaches, sodium pyrophosphate peroxyhydrate, urea peroxyhydrate, and sodium peroxide. Persulfate bleach (e.g., OXONE, manufactured commercially by DuPont) can also be used.

Peroxygen bleaching agents, the perborates, the percarbonates, etc., are preferably combined with bleach activators, which lead to the in situ production in aqueous solution of the peroxy acid corresponding to the bleach activator. Various nonlimiting examples of activators are disclosed in US Patent 4,915,854, issued April 10, 1990 to Mao et al, and US Patent 4,412,934. The nonanoyloxybenzene sulfonate (NOBS) and tetraacetyl ethylene diamine (TAED) activators are typical and are preferred, and mixtures thereof can also be used. See also US 4,634,551 for other typical bleaches and activators useful herein.

Biocides

An antimicrobial active ingredient can function as a biocide. Typical biocides for use in the composition of the present invention include trichlosan and quaternary ammonium compounds, - such as the quaternary surfactant-based agent para-chloro meta xylenol (PCMX).

Enzymes

Enzymes can be included in the composition of the present invention for a wide variety of laundering purposes, including removal of protein-based, carbohydrate-based, or triglyceride-based stains, for example, and for the prevention of dye transfer, and for fabric restoration. The enzymes to be incorporated include proteases, amylases, lipases, cellulases, and peroxidases, as well as mixtures thereof. Other types of enzymes may also be included. They may be of any suitable origin, such as vegetable, animal, bacterial, fungal and yeast origin. However, their choice is governed by several factors such as pH-activity and/or stability optima, thermostability, stability versus active detergents, builders and so on. In this respect bacterial or fungal enzymes are preferred, such as bacterial amylases and proteases, and fungal cellulases.

Other possible ingredients in the components of the composition of the invention include insecticides, anti-allergenic agents, anti-static agents, antimicrobial agents, allergen neutralisers, and anti-fungal agents. Accordingly, the potential uses of the composition of the invention will in essence be determined by the nature and specific characteristics of the ingredient or ingredients selected.

Suitably, the components of the product of the invention comprise water in order to make each component up to 100%. Preferably, the water is de-ionised water.

Particularly preferred formulations of the components are given in Table 1 below.

Table 1

Component 1	Ingredient	Preferred wt% range	More Preferred wt% range	Example wt%
	Sodium thiosulphate	3-10	5-7	6
	2-aminoethanol	4-7	4.5-5.5	5
	Sodium tungstate dihydrate	0.01-1	0.01-0.05	0.05
	N,N-dimethyldodecylamine-N-oxide (30% w/w in water)	2-7	3-4	4
	Benzalkonium chloride	0.01-0.4	0.05-0.3	0.2
	fragrance (e.g. Citrus PS-25-M from Robertet)	0.01-1	0.05-0.5	0.1
	Balance de-ionised water			
Component 2	Hydrogen peroxide	3-8	4-7	6
	Balance de-ionised water			

As the product of the present aspect of the invention features two components in separate compartments, a yet further advantage of the present invention, as noted hereinbefore, is that antagonistic, even slightly antagonistic ingredients, or even mutually exclusive ingredients, can be kept within the same product. Assuming these said ingredients are kept within initially separate components, they will not come into contact as and until the product is in use and the two components are combined together. Antagonistic ingredients, even mildly antagonistic ingredients, could not be used together in practicable pre-formulated products. In the present

invention in which the composition is formed substantially *in situ*, these ingredients can be segregated for as long as is required, i.e. for the shelf-life of the product, in the first and second compartments. Thus, the cleaning product of the invention offers the prospect of valuable efficacy benefits, over pre-formulated products, wherein by "pre-formulated" we mean that all components of the cleaning composition are combined in the cleaning product in a single formulation.

Examples of ingredients that can advantageously be kept apart in the separate first and second compartments respectively, as and until the product is in use, include the following: acidic and alkaline moieties, acidic and halogen-containing moieties, a compound able to release active oxygen and an activator therefor, a peroxide moiety and an alkaline moiety, enzymes and co-enzymes (or enzyme catalyst), an enzyme and a peroxide moiety, an enzyme and a bleach, two enzyme moieties, a peroxide moiety and a hypochlorite compound, two surfactants not being apt for long-term storage in admixture (e.g. an anionic and a cationic surfactant), two fragrances (which may be of a type incompatible for a pre-formulation together or which, when mixed, cause a detectable fragrance change), moieties which when mixed cause a viscosity change or foaming/de-foaming effect, moieties which when mixed lead to the generation of light. It will of course be appreciated that the embodiments described above are not mutually exclusive.

In any or all of the specific embodiments noted above, it is preferable that the first and second components further comprise compositions conventionally used in cleaning

compositions and the like. Hence, the antagonistic ingredients brought together by the application of the stimulus can also themselves function as cleaning agents, or alternatively, may simply indicate to the user that mixing of the phases has taken place and thus that the cleaning composition has now been formed.

The first and second components hereinbefore described can further comprise other ingredients which may have a beneficial effect on the compositions in cleaning methods. For instance, the first and/or second components may further comprise at least one or more surfactants (e.g. of the types described above).

The cleaning composition may be antimicrobial. Preferably, the antimicrobial effect is generated when the first and second components mix. Preferably, an antimicrobial chemical is generated *in situ* or released when the components of the composition mix. The antimicrobial chemical may, for example, comprise an iodate, bromate, thiocyanate, chlorate or peroxy compound, or chlorine dioxide (for example generated from a chlorite), hypochlorous acid (for example generated from hypochlorite), chlorine, bromine or iodine.

As noted hereinbefore, the pH of the composition formed when the components are combined is in the range suitable for direct handling by the user of the composition. Preferably, the pH of the composition is approximately neutral or slightly alkaline, more preferably in the range greater than 7 to 11, even more preferably in the range 7.5 to 10.5, most preferably in the range 7.5 to 10, e.g. in the range 8 to 9.5. In such pH ranges, the composition

is both an effective cleaning composition and is tolerable to the user's skin, even over extended contact periods. Moreover, preferably, the pH value of the composition formed by combining the two components is essentially stable after the combination, at least stable within the pH ranges mentioned hereinabove, more preferably within the preferred ranges mentioned hereinabove. Thus, the products of the present invention are preferably effective in situations where an alkaline composition is effective, for example in situations where the self-emulsification of grease, and the like, is an advantage.

As such, it has surprisingly been found that in addition to the advantages noted hereinbefore, cleaning compositions formed by combining the components of the products of the invention, exhibit certain "self-cleaning" properties. For example, the compositions begin to emulsify and therefore remove common stains, such as grease and greasy stains, and the like. Providing compositions within the pH ranges noted hereinbefore provides unexpected and surprising advantages in that the compositions self-emulsify grease/proteinaceous stains, and the like, particularly, but not exclusively, on hard surfaces.

According to a second aspect of the invention there is provided a method of manufacturing a cleaning product, the method comprising:

a) providing a first compartment and a separate second compartment;

b) providing a first component of a cleaning composition in a stable environment in the first

compartment and a second component of the cleaning composition in a stable environment in the second compartment;

c) sealing the compartments; and

d) arranging said compartments such that each component can be combined together to form said composition, either directly on the surface to be cleaned, or before or immediately before addition of the pre-mixed composition to the surface and wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination.

Preferably, the first compartment, second compartment, first and second components, are as described hereinabove for the first aspect of the invention.

According to a third aspect of the invention there is provided a method of providing a cleaning composition, the method comprising providing a cleaning product of the first aspect of the invention and effecting the combination of the first and second components to form the said cleaning composition, and wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination.

According to a fourth aspect of the invention there is provided a method of treating a surface or part of a surface, preferably cleaning a surface or part of a surface, the method comprising contacting a surface to be treated or cleaned with the cleaning composition produced by the method of the third aspect of the invention, or sequentially, simultaneously, or separately contacting the

said surface with the components of said composition, wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination.

According to a fifth aspect of the invention there is provided the use of a product as defined hereinbefore to form a composition as defined hereinbefore in the treatment of a surface or part of a surface, preferably the cleaning of a surface or part of a surface.

According to a sixth aspect of the invention there is provided a kit comprising separate first and second compartments, the first compartment containing a first component of a composition in a stable environment, the second compartment containing a second component of the composition in a stable environment, wherein, in use, the said two components are combined together to form said composition, and wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination, and wherein the said components can be applied to a surface or released from said kit, simultaneously, sequentially or separately.

According to a seventh aspect of the invention there is provided an applicator means comprising separate first and second compartments, the first compartment containing a first component of a composition in a stable environment, the second compartment containing a second component of the composition in a stable environment, wherein said means can apply said components to a surface simultaneously, sequentially or separately to form said

composition and wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination.

For the avoidance of any doubt, each and every feature disclosed herein in relation to any one or more aspects of the present invention, is equally applicable to any or all of the other aspects of the invention, unless any such features are mutually exclusive or incompatible.

By "compartments", we simply mean a region or container where the particular component is kept until use.

The application of the components to the surface can be carried out by any convenient means, for example, by roll-on, spraying (e.g. from an aerosol or pump dispenser), brushing, painting, pouring, rubbing, squeezing etc. Examples of suitable applicator means include any multi-compartment device wherein the components are kept separate from each other as and until application by the user is desired. As such, the separator means can be any substantially non-porous structure. Applicator means should preferably be user-friendly and easily-portable, such as multi-compartment blister packs (with each component in a separate blister), or multi-headed, multi-nozzle or nibbed applicators (wherein each component is within a separate compartment within the body of the applicator).

When the applicator means is to apply two components, the applicator comprises two separate compartments. However, when the applicator means is to apply more than two components, either an equivalent number of separate

compartments can be provided or, alternatively, an equivalent number of separate compartments can be provided equal to the number of different components.

The compartments of the applicator may contain pre-measured amounts of component to ensure application of the preferred amounts of components. Moreover, compartments may be numbered, or otherwise labelled, to ensure the correct order of sequential application of components.

Alternatively, the components can be mixed or combined within the applicator means before being applied to the surface; preferably, the mixed components should be added to the surface whilst the beneficial elevated temperature properties of the product are still evident.

As noted hereinbefore, it is found that cleaning products comprising cleaning compositions as described hereinbefore, not only may produce an increase in temperature within the composition compared to the temperature of the components, but may produce a cleaning composition that will lead to the self-emulsification of common staining elements, for example grease/fatty stains/proteinaceous stains, and the like. Thus, the compositions of the invention may possess a self-cleaning effect, leading to the cleaning process being begun as soon as the composition is added to the surface to be cleaned, even without any further intervention from the user.

It will be appreciated that the present invention offers many benefits and advantages to the user. In particular, the cleaning products of the invention enable cleaning

compositions to comprise ingredients that under normal conditions would react and/or combine with each other before such reaction and/or combination was required. The ingredients are effectively separated in the compartments of the cleaning products disclosed herein as and until it is desired to use the product, from which point the ingredients will combine, mix and/or react, thus providing the particular desired effect of the embodiment. Moreover, the cleaning compositions are provided at an elevated temperature and begin the cleaning and/or emulsification process on the surface even before the user performs any further function over and above adding the composition to the surface. Furthermore, the cleaning compositions are provided at a stable and advantageous pH level. Furthermore, if a cleaning substrate is used, it need not be pre-heated or warmed, nor need the components of the composition be combined on the substrate; the temperature rise when the components mix ensures the components can be added directly to the surface to be treated/cleaned for the desired effect. The subsequent use of a substrate is thus a convenient, but optional, way of removing the composition from the surface.

In order that the invention be better understood, embodiments of it will now be described by way of the following illustrative and non-limiting examples and the accompanying figures wherein Figures 1-3 show the following:

Figure 1 shows the % cleaning over time of a product of the present invention and a comparative example,

Figure 2 shows the temperature versus time plot for a catalysed and uncatalysed product of the present invention, and

Figure 3 shows the temperature versus time plot for a further catalysed product and uncatalysed product of the present invention.

Examples

The following materials were used in the Examples:

sodium thiosulfate (assay ≥ 98%) supplied by Acros Organics/Fisher Scientific (Leicestershire, UK),
2-aminoethanol (MEA) (assay 99%) supplied by Acros Organics/Fisher Scientific (Leicestershire, UK),
sodium tungstate dihydrate (assay ≥ 99%) supplied by Acros Organics/Fisher Scientific (Leicestershire, UK),
sodium thiosulfate (assay 99%) supplied by Sigma-Aldrich (Dorset, UK),
2-aminoethanol (MEA) (assay ≥ 99%) supplied by Sigma-Aldrich (Dorset, UK),
sodium tungstate dihydrate (assay 99%) supplied by Sigma-Aldrich (Dorset, UK),
Ammonyx LO-E (30% w/w N,N-dimethyldodecylamine-N-oxide in water) supplied by Stepan UK Ltd (Cheshire, UK),
benzalkonium chloride solutions (50% and 80% n-alkyldimethylbenzyl ammonium chlorides in water) supplied by Stepan UK Ltd (Cheshire, UK),
hydrogen peroxide (assay 50%) supplied by Solvay Interox GmbH & Co. KG (Rheinberg, Germany),
Citrus PS-25-M supplied by Robertet (UK) Ltd (Surrey, UK).

Example 1

Grease Test

A grease composition was prepared by mixing commercially-available vegetable oil, vegetable shortening, lard and carbon black. These components were mixed at 60-80°C. The mixture was then applied to a hardboard via a cloth. The mixture on the hardboard was then allowed to dry.

A cleaning product of the present invention was made up as follows:

Component A

6% by weight sodium thiosulfate,
5% by weight MEA,
0.02% by weight sodium tungstate dihydrate,
4% by weight N,N-dimethyldodecylamine-N-oxide solution (30% w/w in water as Ammonyx LO-E),
0.1076% by weight benzalkonium chlorides,
0.1% by weight Citrus PS-25-M,
balance water.

Component B

6% by weight hydrogen peroxide,
balance water.

In each case, the various ingredients of the component were mixed (at room temperature/ambient pressure) to provide each component with the required level of ingredients. Sufficient hydrogen peroxide (assay 50%) was added to give 6% by weight of actual hydrogen peroxide in Component B; balance water.

For comparative purposes, a standard kitchen cleaner formula was also tested, comprising:
1% by weight dipropylene glycol n-butyl ether,
0.1076% by weight benzalkonium chlorides,
0.02% by weight n-decanol,
0.75% by weight MEA,
2% by weight N,N-dimethyldodecylamine-N-oxide solution (30% w/w in water),
0.2% by weight Citrus PS-25-M,
0.002% by weight tartrazine,
balance water.

A still photograph of each untreated grease board was taken. Then 2g of the comparative cleaner was added to one untreated grease board, and 2g of the cleaning product of the invention was added to a further untreated grease board. In the latter case, addition was by the simultaneous addition (from pipettes) of 1g of Component A and 1g of Component B. The cleaning products were then left on the grease boards for 30 seconds and then blotted dry with a paper towel. Specifically, no user intervention occurred after application of the products, apart from the said blotting dry. After the blotting dry, a further still photograph was taken of each grease board and the results compared. No appreciable change in the level of grease was found for the comparative cleaner. On the other hand, the cleaning product of the invention was found to have removed most of the grease where the product was applied, even without any user intervention (apart from blotting).

Example 2

Further Grease Tests by Photospectroscopy

Additional blot grease tests were performed using compositions as detailed in Example 1 on grease patches as also detailed in Example 1.

The grease lifting capability of the compositions was tested by using photospectroscopy (using a Minolta Spectrophotometer CM-3700d). The relevant scale was L* = 100 when the sample was white, and L* = 0 when it was black.

Triplicate samples were blotted after 15, 30, 45 and 60 seconds for both Formula 1 (the two-component composition of the invention from Example 1) and Formula 2 (the comparative composition from Example 1). An average of the 3 samples was taken at each time interval. Visual spectra and appropriate data was taken using the CRIELL L*a*b* colour mode under D65/10° illuminant. The results are shown in Table 2 below, wherein:

% Cleaning = $(L^*_{cleaned} - L^*_{dirty}) / (L^*_{blank} - L^*_{dirty})$ x 100%.

Moreover, Figure 1 of the accompanying drawings shows the % cleaning as a function of time for both Formula 1 and Formula 2.

It is clear from both Table 2 and Figure 1 that the composition of the present invention (Formula 1) shows a significant improvement in cleaning ability (% cleaning) over the whole time period studied, even without user intervention (apart from blotting).

Table 2

% Cleaning = $(L^*_{cleaned}-L^*_{dirty})/(L^*_{blank}-L_{dirty}) \times 100\%$

Sample	Formula	Time (/s)	L*			% Cleaning
			Blank	Dirty	Cleaned	
1	1	15	92.6415	57.3151	75.5881	51.7
2	1	15	92.7528	55.1735	76.9681	58.0
3	1	15	92.6156	56.2349	66.3018	27.7
Ave	1	15				45.8
4	1	30	94.4351	62.2041	82.2760	62.3
5	1	30	92.3498	57.8988	82.8989	72.6
6	1	30	92.4069	57.6972	75.1679	50.3
Ave	1	30				61.7
7	1	45	91.8154	55.3101	83.3213	76.7
8	1	45	91.9425	55.2745	86.3616	84.8
9	1	45	92.1321	48.5174	78.2522	68.2
Ave	1	45				76.6
10	1	60	92.4688	51.2582	82.0660	74.8
11	1	60	91.6972	53.6187	80.0291	69.4
12	1	60	92.2540	56.4127	79.2603	63.7
Ave	1	60				69.3
13	2	15	92.3613	48.0657	53.6857	12.7
14	2	15	92.4851	60.0072	63.9545	12.2
15	2	15	92.3149	54.2797	55.4333	3.0
Ave	2	15				9.3
16	2	30	92.2251	53.6970	61.1354	19.3
17	2	30	92.4440	58.4530	57.8922	-1.6
18	2	30	92.4268	39.6930	54.4273	27.9
Ave	2	30				15.2
19	2	45	92.4810	51.5011	56.0604	11.1
20	2	45	92.4353	59.2380	64.9699	17.3
21	2	45	91.4790	56.8390	66.0119	26.5
Ave	2	45				18.3
22	2	60	91.7156	58.4038	69.4559	33.2
23	2	60	91.6736	57.8053	65.0844	21.5
24	2	60	91.6691	53.4608	64.4797	28.8
Ave	2	60				27.8

Formula	Average % Cleaning at Time (/s)					% Diff. at 30 s
	0	15	30	45	60	
1	0.0	45.8	61.7	76.6	69.3	406.1
2	0.0	9.3	15.2	18.3	27.8	24.6

Example 3

Calorimetry Tests

Two samples were synthesised; one as per Components A and B of Example 1, the other as per Components A and B of Example 1 but without the sodium tungstate dihydrate catalyst of Component A of Example 1.

The pH and temperature of a 25g sample of Component A was recorded. The pH probe was then removed. Then, 25g of Component B was added to Component A and a timer was started. The mixture formed was swirled for 5 seconds and then the temperature was recorded at 15 seconds, 30 seconds and then every 30 seconds thereafter for 4 minutes. The mixture was then allowed to cool to room temperature, at which point the final pH measurement was taken.

The results are shown in Table 3 and Figure 2 of the accompanying drawings. Both samples show a similar heat profile, however the sample containing the sodium tungstate dihydrate catalyst in Component A reaches an elevated temperature before the sample containing no catalyst. Moreover, the catalysed sample has a lower final pH value, i.e., a final pH value closer to neutral pH, even from a slightly higher initial pH value than the uncatalysed sample.

Table 3

Catalyst level (wt%)	Temperature (°C) at Time (s)										pH	
	0	15	30	60	90	120	150	180	210	240	Initial	Final
0.02	23	35	65	70	69	68	66	65	63	62	12.07	9.18
0.00	24	31	58	71	70	68	67	65	64	63	11.97	9.40

Comparative Example 1 (Formula 2) showed no temperature rise over time.

A further example was synthesised; in this case the only difference to Components A and B of Example 1 was that the level of sodium tungstate dihydrate catalyst used was 0.05 wt% of Component A, rather than 0.02 wt%.

A similar calorimetry test was run on the 0.05 wt% catalyst formulation, with all other details as above. The results are shown in Table 4 and Figure 3 of the accompanying drawings (comparison is given with the no catalyst formulation). Once again, the sample containing the sodium tungstate dihydrate catalyst in Component A reaches an elevated temperature before the sample containing no catalyst. Indeed, this effect is still more pronounced than in the case of the 0.02 wt% catalyst formulation above. Moreover, the 0.05 wt% catalyst sample has a lower final pH value, i.e. a final pH value closer to neutral pH, than either the uncatalysed sample or that containing 0.02 wt% catalyst in Component A.

Table 4

Catalyst Wt %	Temperature / Contact time / s										pH	
	0	15	30	60	90	120	150	180	210	240	Initial	Final
0.05	23	45	70	71	70	69	67	66	65	63	11.90	8.81
0.00	24	31	58	71	70	68	67	65	64	63	11.97	9.40

Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any

accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS

1. A product comprising separate first and second compartments, the first compartment containing a first component of a composition in a stable environment, the second compartment containing a second component of the composition in a stable environment, wherein, in use, the said two components are combined together to form said composition, and wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination.

2. A product as claimed in claim 1 wherein said composition is a cleaning composition, preferably a hard surface cleaning composition.

3. A product as claimed in either of claims 1 and 2 wherein the temperature of the said composition formed is elevated by at least 5°C when compared to the temperature of the components prior to said combination.

4. A product as claimed in claim 3 wherein said temperature elevation is at least 20°C.

5. A product as claimed in claim 3 wherein said temperature elevation is at least 30°C.

6. A product as claimed in any preceding claim wherein both of said components are liquid.

7. A product as claimed in any preceding claim wherein one of the said first and second components comprises an

oxidising agent, whilst the other of the said first and second components comprises a reducing agent.

8. A product as claimed in claim 7 wherein said oxidising agent is a peroxide.

9. A product as claimed in either of claims 7 and 8 wherein said oxidising agent is hydrogen peroxide.

10. A product as claimed in any of claims 7 to 9 wherein said oxidising agent is present in the range of 4 to 7 wt% of the component.

11. A product as claimed in any of claims 7 to 10 wherein said reducing agent is a thiosulfate.

12. A product as claimed in any of claims 7 to 11 wherein said reducing agent is sodium thiosulfate.

13. A product as claimed in any of claims 7 to 12 wherein said reducing agent is present in the range of 4 to 7 wt% of the component.

14. A product as claimed in any of claims 7 to 13 further comprising a catalyst in the component comprising said reducing agent.

15. A product as claimed in claim 14 wherein said catalyst is capable of catalysing the redox reaction between the said reducing agent and the oxidising agent in the other compartment of the product.

16. A product as claimed in either of claims 14 and 15 wherein said catalyst is a tungstate compound.

17. A product as claimed in claim 16 wherein said tunstate compound is sodium tungstate, preferably sodium tungstate dihydrate.

18. A product as claimed in any of claims 14 to 17 wherein said catalyst is present in the range 0.01 to 0.5 wt% of the component comprising the reducing agent.

19. A product as claimed in any preceding claim wherein at least one component further comprises at least one surfactant and/or emulsification aid, preferably in the component comprising a reducing agent.

20. A product as claimed in claim 19 wherein said at least one surfactant and/or emulsification aid is present in the range 0.5 to 2.5 wt%, preferably 0.6 to 2.1 wt% of the component comprising a reducing agent.

21. A product as claimed in any preceding claim wherein at least one component comprises a base.

22. A product as claimed in claim 21 wherein said base is present in the component comprising a reducing agent.

23. A product as claimed in claim 22 wherein said base is present in the range 3 to 10 wt%.

24. A product as claimed in any preceding claim wherein the pH of the composition formed when the components are combined is greater than or equal to 7.

25. A product as claimed in claim 25 wherein said pH is in the range greater than 7 to 11.

26. A product as claimed in claim 25 wherein said pH is in the range 7.5 to 10.

27. A product as claimed in any preceding claim wherein said product is a cleaning product and said composition is a cleaning composition.

28. A product as claimed in any preceding claim wherein said product is an inanimate surface cleaning product.

29. A product as claimed in any of claims 1 to 27 wherein said product is a hard surface cleaner, and wherein said composition is a hard surface cleaning composition.

30. A product as claimed in any of claims 1 to 27 wherein said product is a soft surface cleaner, and wherein said composition is a soft surface cleaning composition.

31. A method of manufacturing a cleaning product, the method comprising:

a) providing a first compartment and a separate second compartment;

b) providing a first component of a cleaning composition in a stable environment in the first compartment and a second component of the cleaning composition in a stable environment in the second compartment;

c) sealing the compartments; and

d) arranging said compartments such that each component can be combined together to form said composition, either directly on the surface to be cleaned, or immediately before addition of the pre-mixed composition to the surface and wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination.

32. A method of providing a cleaning composition, the method comprising providing a product as defined in any of claims 1 to 30 and effecting the combination of the first and second components to form the cleaning composition, and wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination.

33. A method of treating a surface or part of a surface, preferably cleaning a surface or part of a surface, the method comprising contacting a surface to be treated or cleaned with the cleaning composition produced by the method described in claim 32.

34. A kit comprising separate first and second compartments, the first compartment containing a first component of a composition in a stable environment, the second compartment containing a second component of the composition in a stable environment, wherein, in use, the said two components are combined together to form said composition, and wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination, and wherein the said components can be applied to a surface or

released from said kit simultaneously, sequentially or separately, or pre-mixed.

35. A kit as claimed in claim 34 wherein said composition is a cleaning composition.

36. An applicator means comprising separate first and second compartments, the first compartment containing a first component of a composition in a stable environment, the second compartment containing a second component of the composition in a stable environment, wherein said means can apply said components to a surface simultaneously, sequentially or separately, or pre-mixed to form said composition and wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination.

37. Applicator means as claimed in claim 36 wherein said composition is a cleaning composition.

38. A product or cleaning product substantially as described herein.

39. A method, kit, or applicator means substantially as described herein.

ABSTRACT

CHEMICAL COMPOSITION AND USES

The present invention provides a product comprising separate first and second compartments, the first compartment containing a first component of a composition in a stable environment, the second compartment containing a second component of the composition in a stable environment, wherein, in use, the said two components are combined together to form said composition, preferably a cleaning composition, and wherein the temperature of said composition is elevated when compared to the temperature of the components prior to said combination, a method of manufacturing a cleaning product, a method of providing a cleaning composition, a method of cleaning a surface, a kit, and an applicator means.

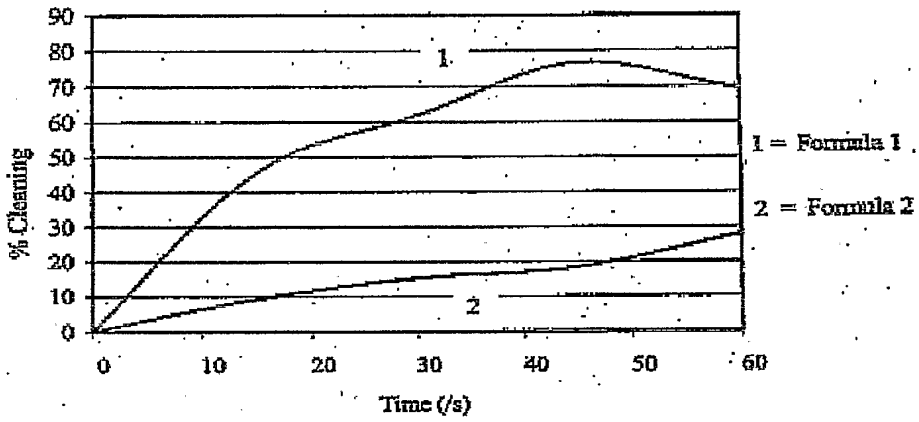


Figure 1

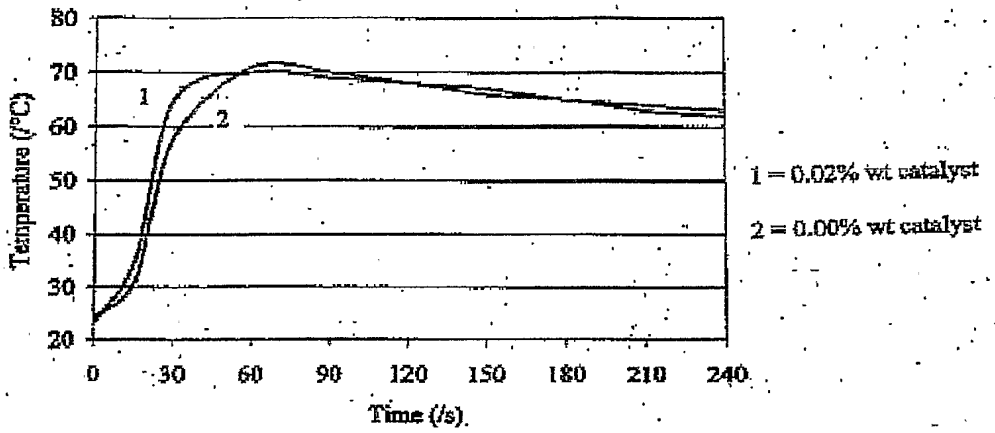


Figure 2

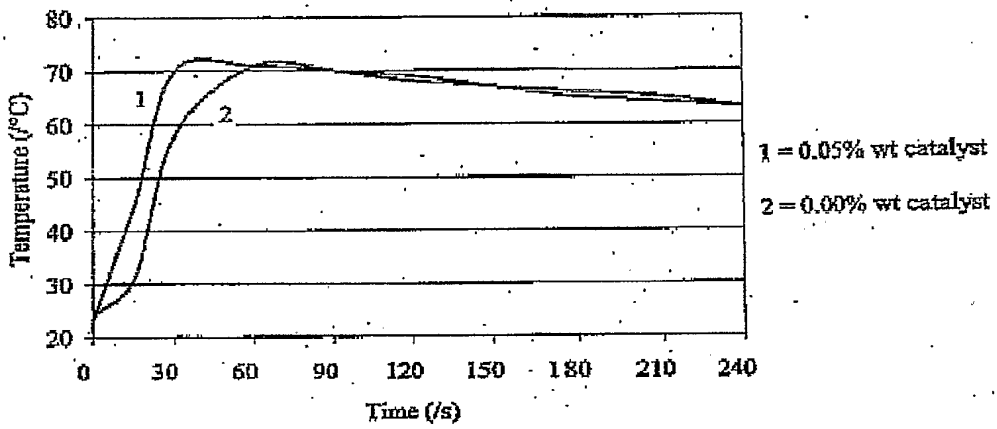


Figure 3